APPENDIX 5.

Indian Creek Subwatershed

Agricultural TMDL Implementation Plan

Table of Contents

List of Figures

List of Tables

1.0 Executive Summary

Subwatershed: Indian Creek Subwatershed
Total Scope: 48,135 acres (includes contributing canal acreage)
Agricultural Scope: 21,317 acres
Agricultural Critical Acres Scope: 20,281 acres

Location: South side of the Boise River, located within the cities of Kuna, Nampa, and Caldwell, and north of Lake Lowell in both Ada and Canyon counties

Elevation: 2,780 feet at the New York Canal to 2,360 feet at the Boise River.

Priority Subwatershed: High

Cooperating Agricultural Agencies: Canyon Soil Conservation District (CSCD)
Ada Soil & Water Conservation District (ASWCD)
Natural Resources Conservation Service (NRCS)
Idaho Soil Conservation Commission (ISCC)

Agricultural Land Uses:

Landuse	Acres	Percent of Indian Creek Subwatershed
Surface Irrigated Cropland	18,959	39%
Surface Irrigated Pasture	1322	3%
Sprinkler Irrigated Cropland and Pasture	1036	2%
CAFO/AFO	N/A	N/A
TOTAL	**21,317**	**44%**

Major Agricultural Products: Seed corn, alfalfa and clover for seed and/or hay, beans, sugar beets, winter and spring wheat, sweet and field corn, barley, potatoes, onions, specialty seed crops, vegetables, livestock, and dairy products.

TMDL Objectives: The Idaho Soil Conservation Commission (ISCC) has prepared this plan to implement the Total Maximum Daily Load (TMDL) for the Lower Boise River. The overall objective of the TMDL is to achieve water quality that will support appropriate designated uses for the river. The TMDL establishes instream targets for total suspended solids (TSS) and bacteria and sets goals for reducing the loads of sediment and bacteria from the tributaries to the Lower Boise River in order to achieve the instream targets The instream targets are to be attained within the river near the cities of Middleton and Parma. The purpose of the instream TSS targets is to protect fish species that may be adversely impacted by instream TSS levels that exceed the concentration and duration components of the targets. The purpose of the bacteria target is to protect human health.

The TSS instream concentration is 50 mg/L for no more than 60 days, and 80 mg/L for no more than 14 days. To attain these durational instream concentration targets, the TMDL sets a sediment reduction goal of 37% at the mouth of the Indian Creek. The bacteria target requires a maximum geometric mean no greater than 50 CFU/100 mL based on a minimum of five samples taken over a thirty-day period (IDAPA 16.10.02.250.01.a). To attain this target, the TMDL seeks to reduce bacteria colonies in the river by 76% at Middleton and 93% at Parma, and calls for bacteria reduction goals for the tributaries ranging from 92% to 98% for primary contact recreation.

The TMDL does not establish nutrient targets for the Lower Boise River or nutrient reduction goals for the tributaries because there is no nutrient-caused impairment (i.e. excessive aquatic plant or algae growth) in the Lower Boise River. It is expected, however, that the TMDL for the Hells Canyon reach of the Snake River (RM 409 to RM 288 “SR-HC TMDL”) will establish nutrient-reduction goals for the Boise River and other tributaries and upstream sources to the SR-HC TMDL reach. In anticipation of a nutrient-reduction goal for the Boise River, the Lower Boise TMDL calls for no net increase (NNI) of current TP loads to the Lower Boise River.

Implementation Plan: This Implementation Plan identifies best management practices (BMPs) and prioritizes agricultural lands in Indian Creek Subwatershed for BMP implementation to achieve the TMDL's objectives within the Lower Boise River watershed. Proposed BMPs include, but are not limited to, sprinkler irrigation systems, surge irrigation systems, drip irrigation systems, sediment basins, filter strips, polyacrylamide (PAM) application, irrigation water management*****, pest management, nutrient management, conservation tillage, and livestock grazing management.

Three BMP installation alternatives are evaluated for each of the four different agricultural land use types (Treatment Units) within the Indian Creek Subwatershed. Estimated costs to install BMPs on lands identified for treatment are: Alternative 1 **-** $16,562,100; Alternative 2 **-** $10,502,200; and Alternative 3 **-** $5,470,250. These cost estimates do not include costs of acquiring necessary real property interests and permits, or annual operation and maintenance costs.

2.0 Introduction

The Indian Creek Subwatershed encompasses 48,135 acres. It includes the lower portions of Indian Creek and various contributing canal subwatersheds in addition to a large agricultural drain that accepts the flow of various other agricultural drains before entering Indian Creek. This large agricultural drain is called Wilson Drain and begins just north of the upper dam at Lake Lowell. Wilson Drain flows north from its headwaters before joining Indian Creek in the city of Caldwell. Indian Creek flows in a northwesterly direction from the Mora Canal, shares a channel with the New York Canal for a stretch through the city of Kuna, then continues through Nampa and Caldwell before reaching the Boise River about 2.5 miles downstream from its confluence with Wilson Drain.

This implementation plan will address the nonpoint, agricultural sources of sediment, nutrients, and bacteria that impact the Lower Boise River from Indian Creek. Within this plan the following elements are identified: pollutant problems within Indian Creek Subwatershed, sources of those pollutants, critical acres contributing pollutants to the subwatershed, priority areas for treatment, and Best Management Practices (BMPs) that, when applied, will have the greatest effect on improving water quality.

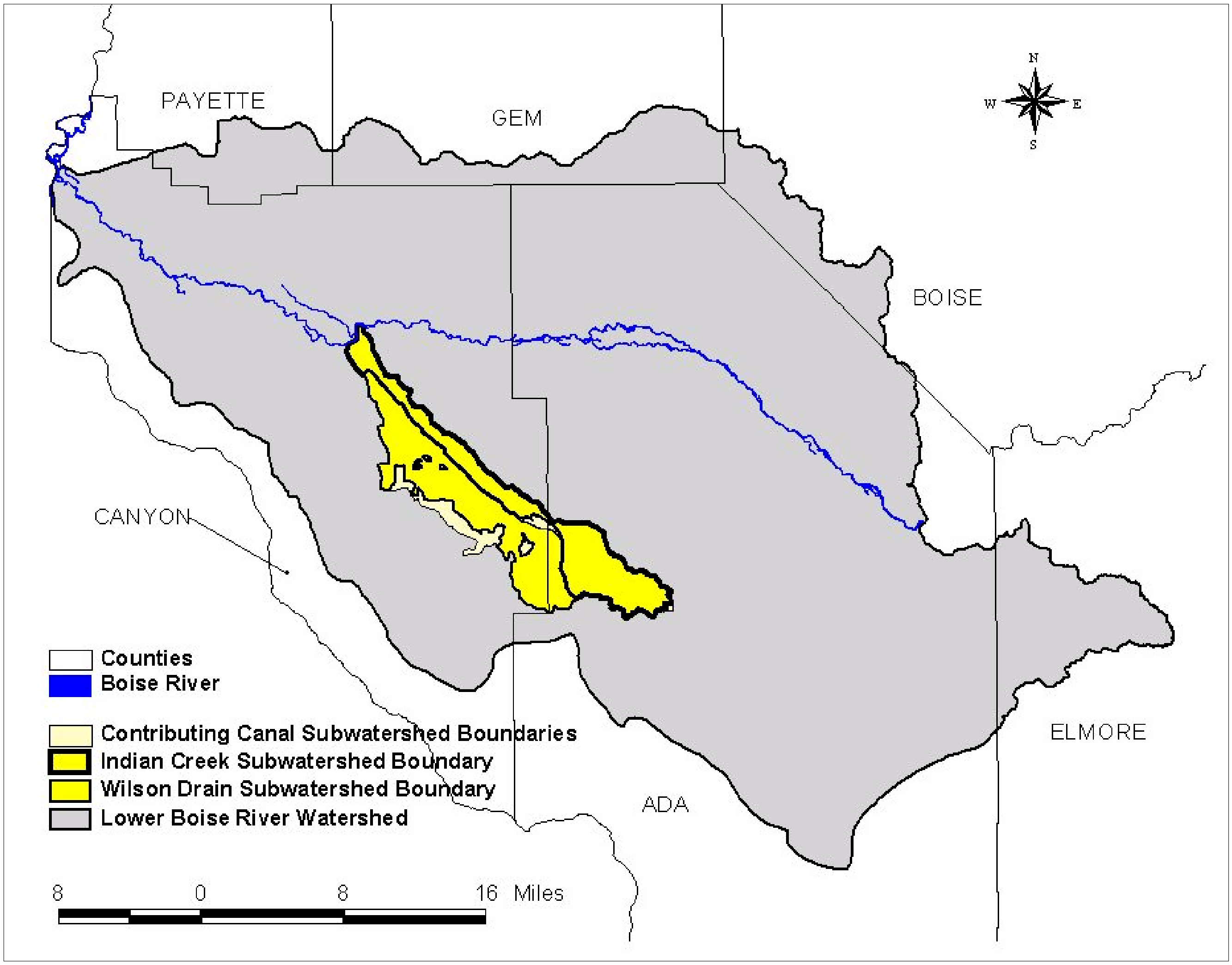
Efforts to gather additional bacteria, sediment, and nutrient data are either underway or planned. Information developed through these efforts may be used to revise the appropriate portions of the Implementation Plan, and determine and adjust appropriate implementation methods and control measures.

The costs to install BMPs on agricultural lands are estimated in this plan to provide the local community, government agencies, and watershed stakeholders some perspective on the economic demands of meeting the TMDL goals. Availability of cost-share funds to agricultural producers within the Indian Creek Subwatershed will be necessary for the success of this plan and the final reduction of pollutants necessary to meet the TMDL requirements at the mouth of Indian Creek. Sources of available funding and technical assistance for the installation of BMPs on private agricultural land are outlined in Appendix 2 of the Lower Boise River Agricultural Implementation Plan.

It is recommended that landowners within Indian Creek Subwatershed contact the Ada Soil & Water Conservation District (Ada SWCD), Canyon Soil Conservation District (Canyon SCD), Natural Resources Conservation Service (NRCS), or Idaho Soil Conservation Commission (ISCC) to help determine the need to address water quality and other natural resource concerns on their land. This plan is not intended to identify which specific BMPs are appropriate for specific properties, but rather provides a subwatershed approach for addressing water quality problems attributed to runoff from agricultural lands.

*** Irrigation Water Management (IWM) involves providing the correct amount of water at the right times to optimize crop yield, while at the same time protecting the environment from excess surface runoff and deep percolation. Irrigation water management includes techniques to manage irrigation system hardware for peak uniformity and efficiency, as well as irrigation scheduling and soil moisture monitoring methods.**

Figure 1. Indian Creek Subwatershed Location



3.0 Watershed Characterization

This section describes watershed characteristics that affect the types, locations, and effectiveness of BMPs proposed in this implementation. These characteristics include soils, climate, surface hydrology, demographics and economics, ground water hydrology, and land ownership and land use in Indian Creek Subwatershed.

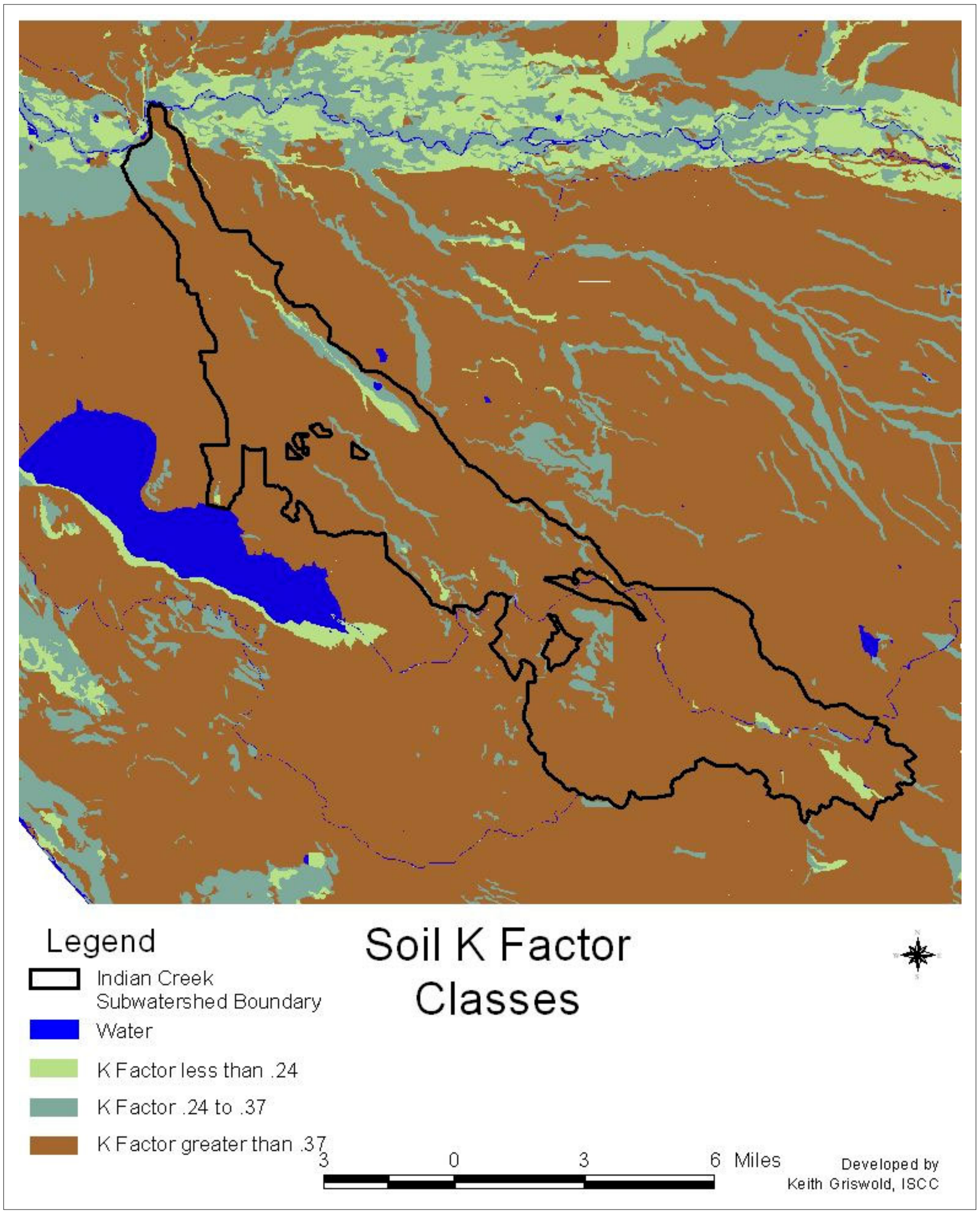
3.1 Soils

There are five major soil associations within Indian Creek Subwatershed (U. S. Department of the Agriculture, 1972).

- *Moulton-Bram-Baldock-Falk:* Moderately well and poorly drained soils on floodplains and low river terraces
- *Power-Purdam:* Well drained silt loams on nearly level to moderately sloping alluvial fan terraces
- *Colthorp-Elijah-Purdam:* Well drained soils with duripans on intermediate alluvial fan terraces
- *Minidoka-Marshing-Vickery:* Well drained silt loams with duripans on higher alluvial fan terraces
- *Power-Purdam-Potratz:* Well drained silt loam soils formed in alluvium on basalt plains

Due to the arid and temperate climate, soils generally have weakly developed profiles, are unleached, are alkaline and have a high natural fertility. Soil "K Factor" classes are used to determine a soils erodibility potential. The higher the K-Factor rating, the greater the potential for erosion (Figure 2). In addition to K-Factor classes, soil slope classes provide another indication of erosion potential. As with K-Factor classes, the greater the percentage of slope, the greater the potential for erosion (Figure 3).

Figure 2. Indian Creek Subwatershed K Factor Classes



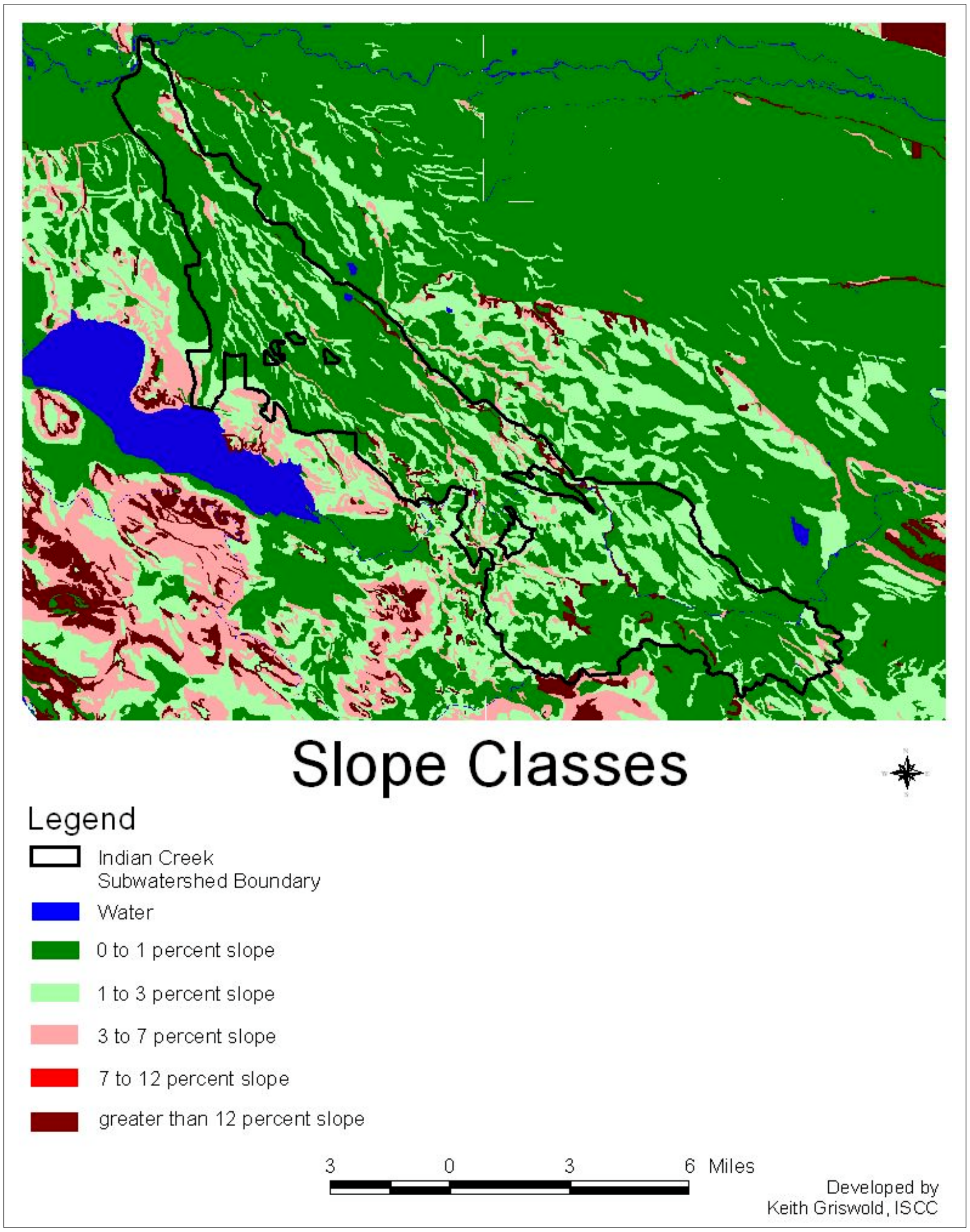
3.2 Climate

Climate in this area is characterized by cool, moist winters and hot, dry summers. The average daily maximum temperature during the summer in Boise, Idaho is 83.9°Fahrenheit, while the average daily minimum temperature during the winter is 25.9°Fahrenheit. Temperatures as low as –23.0°Fahrenheit and as warm as 111.0°Fahrenheit have been recorded (Climate Data Center, 2000).

Long term average annual precipitation for Boise is 11.9 inches. Approximately 57 percent of the yearly precipitation occurs during the November through March period. Average precipitation during the April to September growing season is less than 4 inches in the valley, and extended periods without precipitation occur annually during the summer months.

The average consecutive frost-free period (above 32 degrees) is 152 days, based on the Boise Airport long-term climatic data station. A probability analysis of the data shows 8 years in 10 will have a frost-free season of at least 135 days for this area. The average last frost (32 degrees) in the spring is around May 8 and the average first frost (32 degrees) in the fall is around October 8 (U. S. Department of the Agriculture, 1977).

Figure 3. Indian Creek Subwatershed Slope Classes



3.3 Surface Hydrology

Pre-existing ephemeral channels have been modified over time by channelization and bank stabilization prior to the construction of irrigation and drainage systems for water delivery and drainage for croplands and pastures. There are currently six major canals (Mora, New York, Ridenbaugh, Phyllis, Caldwell Lowline, and Notus) that supply water to cropland in Indian Creek Subwatershed and two major drains (Indian Creek and Wilson Drain) that receive tailwater from the croplands and pastures or drain ground water.

Reuse of agricultural tailwater is common in the subwatershed. Although Indian Creek begins at the Mora Canal, at its confluence with the New York Canal, the creek and the canal actually share a channel. All of the water from Indian Creek during irrigation season has the potential to be diverted into the canal for reuse, essentially forming an additional artificial headwaters of the creek (ISCC photo inventory, 2000). The reuse component along with in stream water quality data has led the local Conservation Districts and the Soil Conservation Commission to identify critical acres for treatment that fall primarily downstream from the confluence with New York Canal, with much of the acreage falling within the Wilson Drain area.

Figure 4. Surface Hydrology

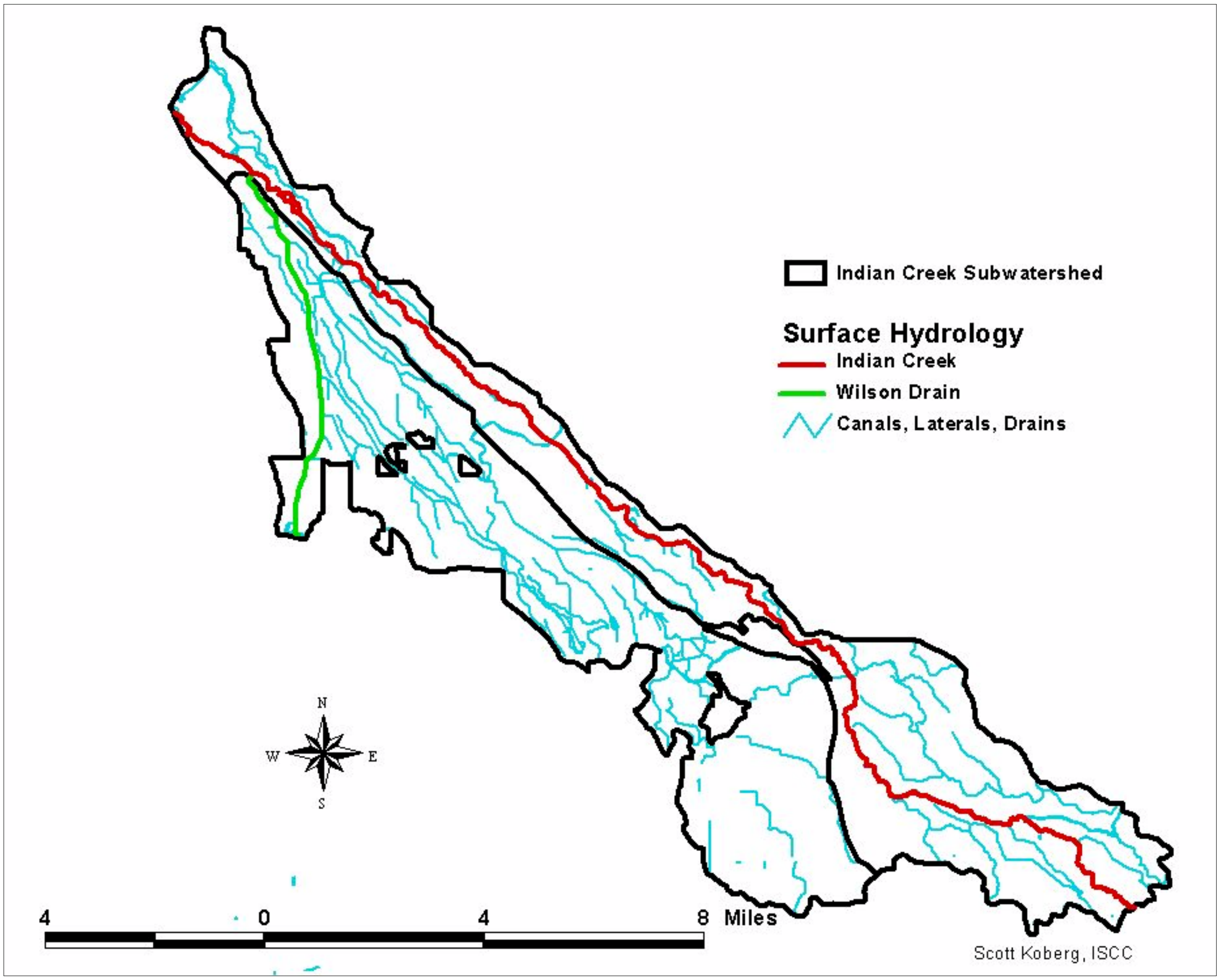
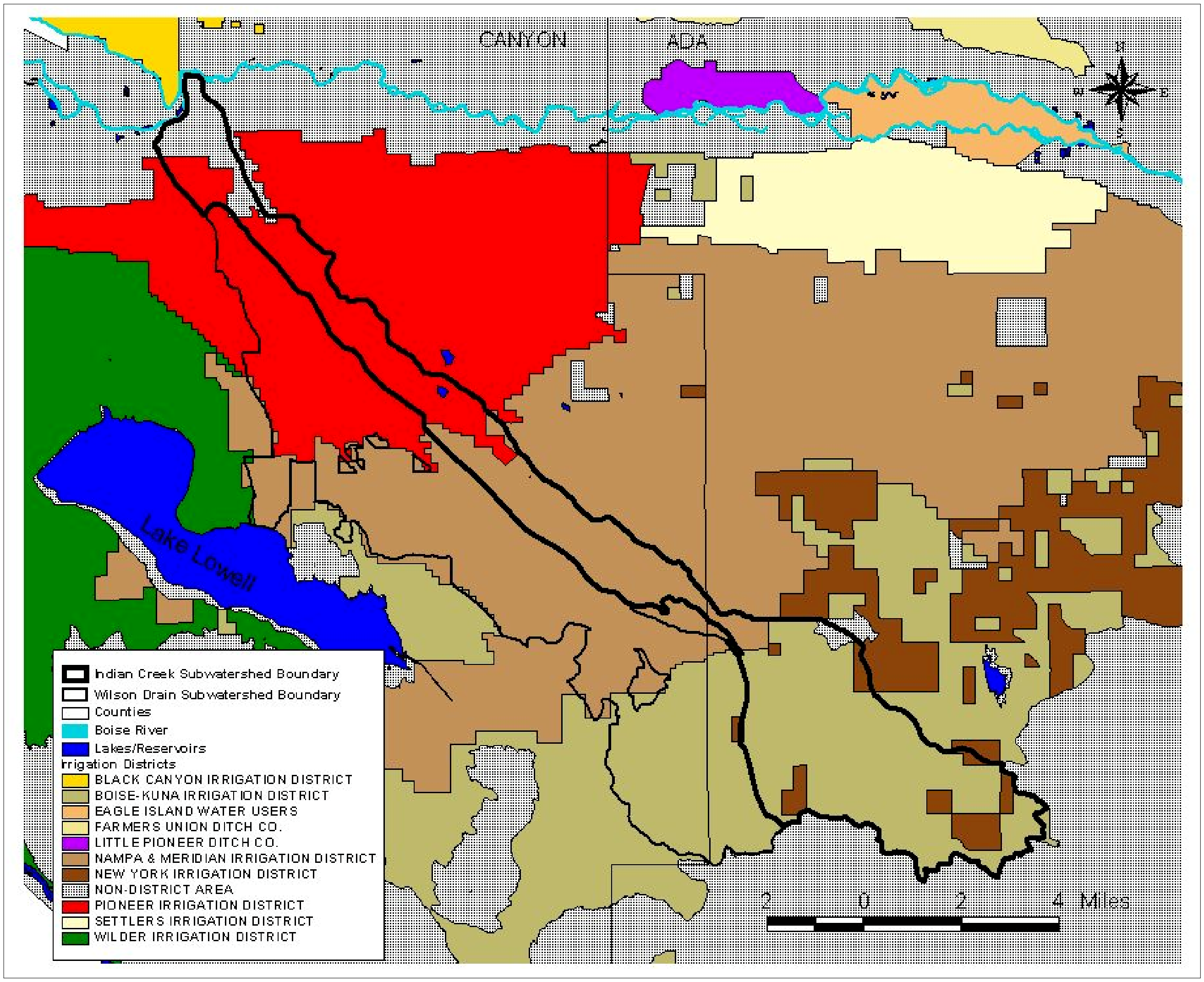


Figure 5. Irrigation Districts



3.4 Ground Water Hydrology

Prior to irrigation development during the 1900's, the large shallow aquifer under the Boise Valley did not exist. This aquifer (< 200 feet) is recharged annually by surface irrigation and earthen canals that recharge the artificial and natural drains throughout the year. Indian Creek Subwatershed sits atop the shallow Boise Valley aquifer and contributes to its recharge through surface irrigation and seepage.

3.5 Demographics and Economics

The Lower Boise River Watershed has experienced accelerated growth within the last 10 years. Ada and Canyon counties in particular experienced growth rates well above the state and national averages during the period from 1990 to2000. Ada County with a year 2000 population of 300,904 and Canyon County with a year 2000 population of 131,441 have increased at rates of 46.2% and 45.9% respectively (U.S. Census Bureau, 2001). These increases are huge when compared to the national average of 13.1% and Idaho state average of 28.5% during the same period.

The Indian Creek Subwatershed has been impacted significantly by the rapid growth in the Treasure Valley. The upper portion of the subwatershed has experienced rapid conversion of agricultural lands to urban and suburban land use as the city of Kuna (population 5,382) expands in every direction. The central and lower portions of the subwatershed has been impacted to a greater extent as agricultural lands are continually converted to urban, industrial, and residential developments near the cities of Nampa and Caldwell. Much of the growth in Nampa (population 51,867) and Caldwell (population 25,967) is occurring to the south and west of Nampa and to the south of Caldwell towards Lake Lowell, mostly within the Indian Creek Subwatershed.

Unlike the upper portion of the subwatershed (upstream from Nampa) which consists mainly of alfalfa, clover, spring wheat, winter wheat, and pasture, the lower portion consists largely of lower residue crops such as seed corn, beans, sugar beets, sweet corn, field corn, onions, potatoes, specialty seed crops and vegetables. High residue crops such as spring wheat, winter wheat, alfalfa, clover, and pasture are also present in the lower portion (downstream from Nampa).

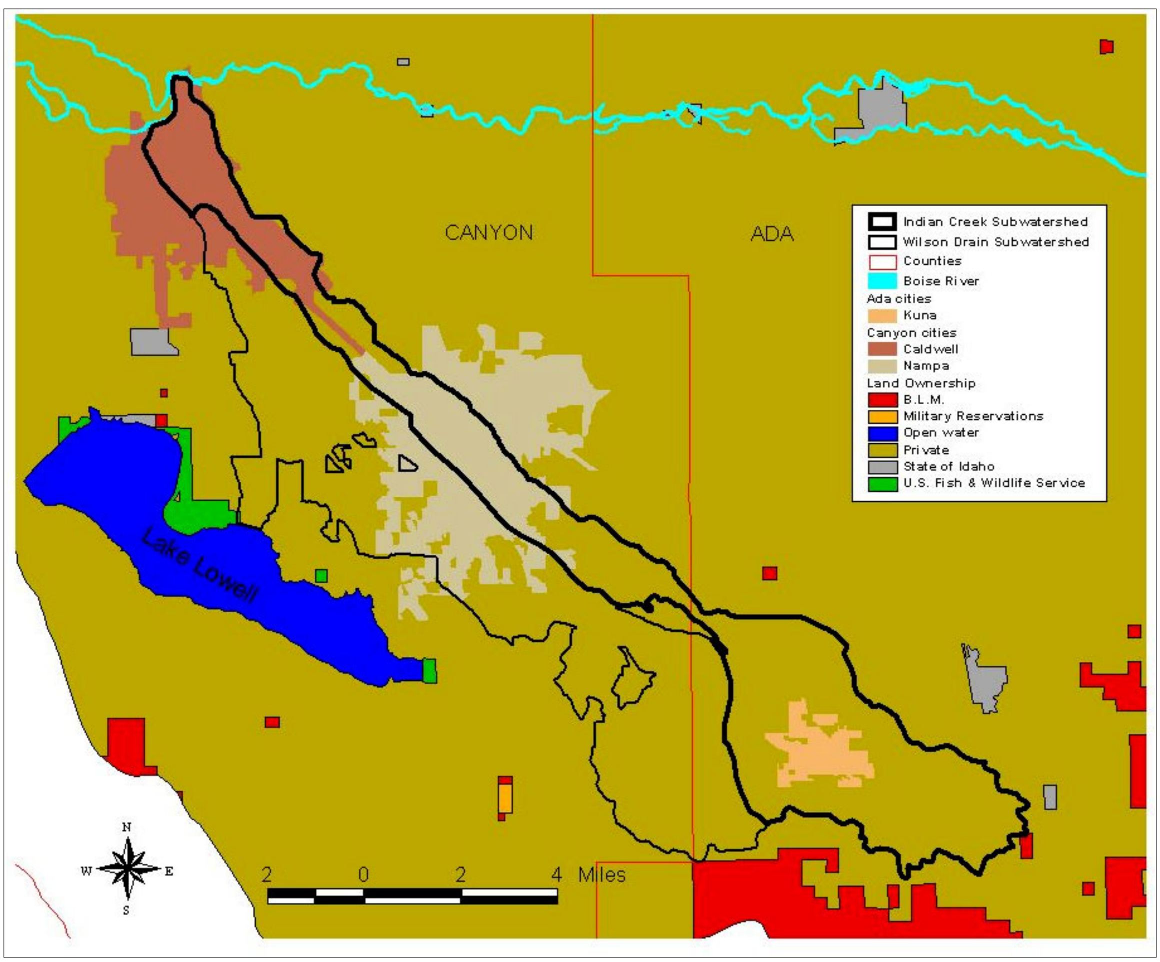
Table 1. 2001 Agricultural Data for Indian Creek Subwatershed

Inventory: Farms & Cropland	Indian Creek Subwatershed
Total # of Farms (FSA Tracts)	598
Total Acres of Farms	21,317
Average Farm Size (acres)	35.6
Total Acres in Cropland	19,995

3.6 Land Ownership and Land Use

Other than the lands that are incorporated into the cities of Kuna, Nampa, and Caldwell, Indian Creek Subwatershed is 100% privately owned (Figure 6). Irrigated cropland is the largest agricultural use within the subwatershed, while irrigated pasture is a distant second, followed closely by sprinkler irrigated cropland and pasture.

Figure 6. Land Ownership



4.0 Treatment Units

This section presents information on the individual agricultural land uses within the Indian Creek Subwatershed. Each land use is divided into one or more Treatment Units (TUs) (Figure 7). The TUs describe areas with similar use, management, soils, productivity, resource concerns, and treatment needs. The TUs not only provide a method for delineating and describing land use but are also used in evaluating land use impacts to water quality and in the formulation of alternatives for addressing the identified problems.

- **Treatment Unit #1 – Surface Irrigated Cropland: 18,959 acres**

  Surface irrigation occurs on silt loam and loam soils on slopes from 0-12%, with the majority of the cropland less than 3% slope. Typical cropping sequence is alfalfa seed or hay, row crops, and grain. Row crops include potatoes, sugar beets, beans, onions, and corn. Most of the wastewater enters an extensive system of low gradient excavated drain ditches or canals.

- **Treatment Unit #2 – Surface Irrigated Pasture: 1,322 acres**

  Surface irrigated pastures are characterized by silt loam soils with slopes ranging from 0-12% with the majority of pastures less than 3% slope. Pastures are typically grazed throughout much of the season (Spring-Fall) with little re-growth allowed in the Fall. Some pastures are used for feeding areas for large herds of livestock during the winter. Wastewater runoff from the surface irrigated pastures has the potential to enter the Lower Boise River via Indian Creek.

- **Treatment Unit #3 – Sprinkler Irrigated Cropland and Pasture: 1,036 acres**

  This unit is located throughout the subwatershed. Typical cropping sequence is alfalfa hay, row crops and grain. Row crops include potatoes, sugar beets, mint, and corn. This area has little or no impact on Lower Boise River water quality due to high irrigation efficiencies resulting in little or no runoff.

- **Treatment Unit #4 – CAFO/AFO: 16 units**

  Feedlots are small in land area and generally occupied by cattle during the winter and spring months (November through April), with most located on farmsteads. See Table 5. Dairies and feedlots are under regulations or strict recommendations to eliminate runoff up to a 25 year, 24 hour storm events as well as average 5-year runoff rates from the feeding and milking facilities. Where animal wastes are applied to croplands, existing State and NRCS standards are required for dairy operators.

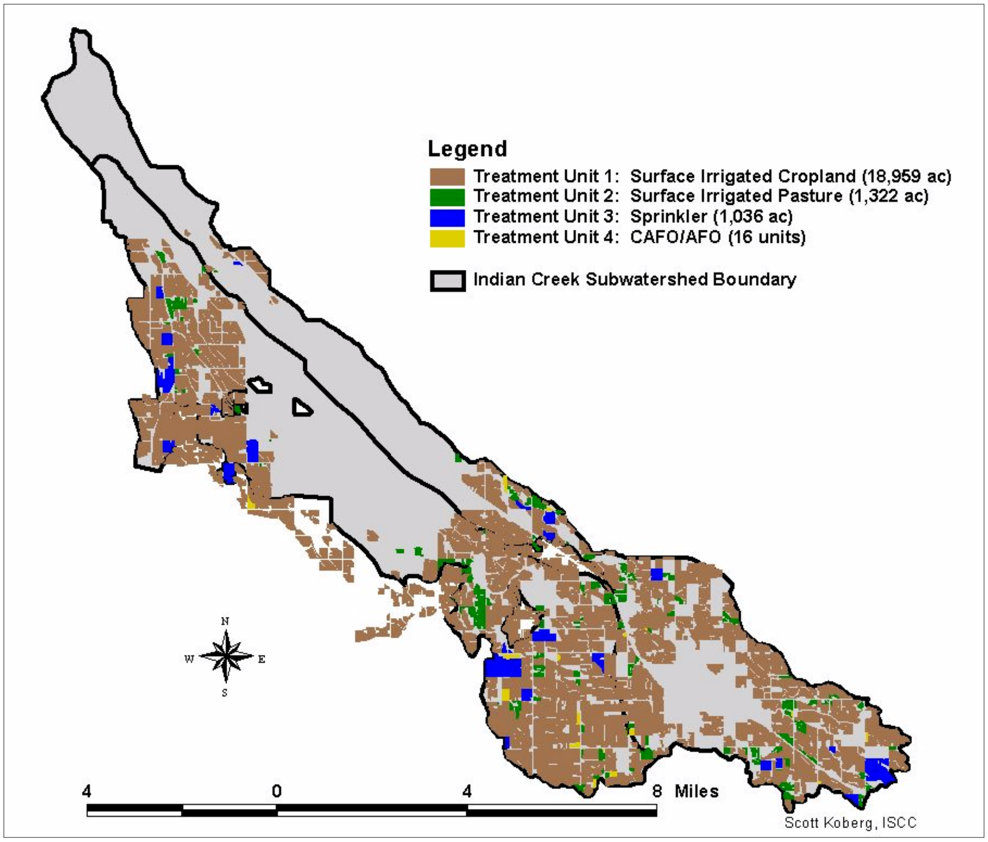
  As required by Idaho State Law, all producing and selling dairy facilities have submitted a Nutrient Management Plan submitted to Idaho Department of Agriculture.

Table 2. Acres of TUs within Indian Creek Subwatershed.

Treatment Units	Acres
Treatment Unit 1	18,959
Treatment Unit 2	1,322
Treatment Unit 3	1,036
Treatment Unit 4	N/A
TOTAL	**21,317**

(Koberg, 2001)

Figure 7. Treatment Units



5.0 TMDL Objectives

The overall objective of the TMDL is to achieve water quality that will support appropriate designated uses for the Lower Boise River. To support aquatic life and recreational uses, the TMDL seeks to meet state bacteria criteria and a Total Suspended Sediment (TSS) target in the Boise River by establishing "load" reduction goals for several drains or tributaries to the Lower Boise River, including Indian Creek.

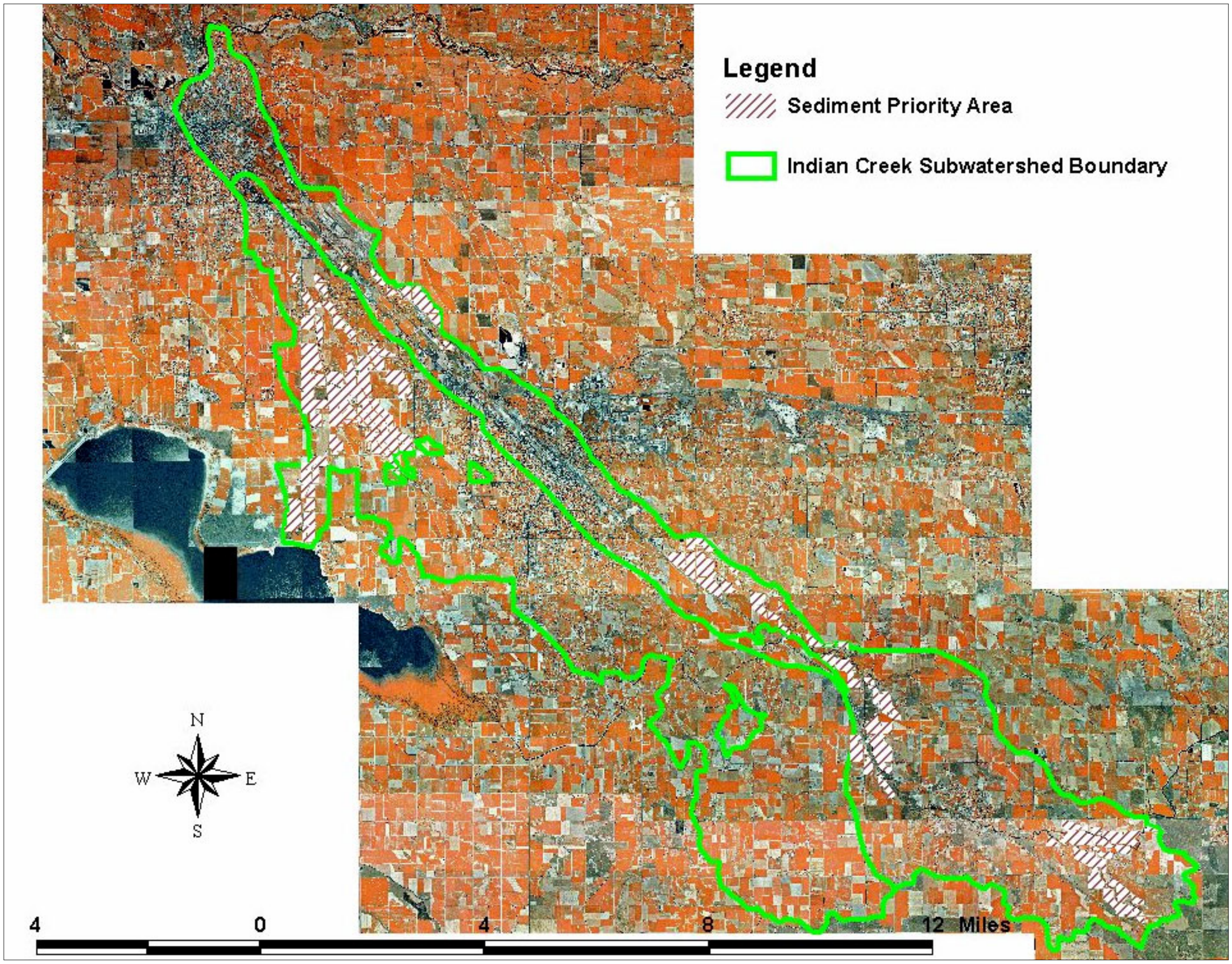
The TMDL recognizes that the targets and load reductions may be revised as additional data is collected, as understanding of water quality in the river improves, and as state water quality standards adapt to reflect new developments. After the TMDL targets and load reductions were established for sediment and bacteria, additional sediment data have been collected, the State of Idaho's bacteria criteria has changed, and a DNA analysis of bacteria to determine bacteria sources has been conducted. This new information and data collection indicate that the Lower Boise River may be closer to achieving its TMDL targets than originally assumed in the Subbassin Assessment.

While there is no nutrient-caused impairment of the Lower Boise River, IDEQ expects to require nutrient load reductions in the Lower Boise River watershed to reduce algae production in the Snake River as part of the Snake River – Hells Canyon (SR-HC) TMDL. The SR-HC TMDL is due to be submitted to EPA at the end of 2001. After EPA approval, IDEQ will expect the Lower Boise River Watershed Advisory Group (WAG) to identify actions necessary to meet the new load reduction targets at the mouth of the Lower Boise River. Until then, this implementation plan will be based on IDEQ's "No Net Increase" nutrient policy for the Lower Boise River.

Agricultural sources of sediment, bacteria and nutrients include surface irrigated cropland and pastures, animal feedlots, livestock grazing waterways and ditch maintenance**.** BMPs can be implemented to address the following:

- Irrigation induced erosion
- Irrigation tailwater delivery to receiving water bodies
- Lack of adequate vegetation adjacent to waterways necessary for reducing sediment, nutrients, and pathogens from runoff.
- Animal feedlots in and adjacent to waterways delivering excess sediment, nutrients, and bacteria.

Figure 8. Indian Creek Subwatershed Priority Area



5.1 Recreational Uses – Bacteria Objectives

The Lower Boise River TMDL established a 94% bacteria reduction target for primary contact recreation and a 48% reduction target for secondary contact recreation in Indian Creek to meet Idaho's fecal coliform criteria (Table 3).

Table 3. Reductions Required to Meet Bacteria Load Allocation

Name	Primary Geo-Mean CFU/100 ml	Primary Load Allocation CFU/100 ml geometric mean	Primary Percent Reduction	Secondary Geo-Mean CFU/100 ml	Secondary Load Allocation CFU/100 ml geometric mean	Secondary Percent Reduction
Indian Creek	**770**	**50**	**94%**	**384**	**200**	**48%**

(IDEQ, 1998)

Two developments affect this reduction objective and the agricultural BMP implementation that would be required to achieve it. Idaho's bacteria criteria was changed from fecal coliform to E. Coli (Escherichia coli). Data show that Lower Boise E. Coli levels do not exceed the new criteria. In addition, preliminary DNA results of bacteria samples from various locations in the Lower Boise River watershed indicate that natural sources of bacteria (e.g. birds, ducks, geese, deer, rodents, and raccoon) beyond human control contribute largely to the current bacteria loads in the river. The current TMDL targets for bacteria may be unattainable as a result of these natural sources of fecal coliform and E. coli. It is likely that sources of bacteria from cows and other agricultural livestock can be reduced by implementing BMPs that limit their access to the Boise River and its tributaries while providing alternative watering sources.

Table 4. Description of Confined Animal Feeding Operations in Indian Creek Subwatershed

Type of Confined Animal Feeding Operation (CAFO)	Number of CAFO's in Indian Creek Subwatershed
Dairy Cattle	11
Beef Cattle	5
Total	**16**

(Koberg, 2001)

5.2 Aquatic Life Uses – Sediment Objectives

The approach selected by the local and state agencies responsible for addressing resource concerns on agricultural lands is to seek voluntary implementation of best management practices (BMPs) on agricultural lands with state and federal cost-share incentive programs to reduce Total Suspended Sediment loading rate by 37%.

Table 5. 1995 TSS loads and allocations for Indian Creek

Tributary	1995 Loads (Tons/day)	% of 1995 Total Watershed Load	TSS Load Allocation (Tons/day)
Indian Creek	9.11	6%	5.74

(IDEQ, 1998)

5.3 Aquatic Life Uses – Phosphorus Objectives

As per the *Lower Boise River TMDL Subbasin Assessment*, total phosphorus is subject to a No Net Increase (NNI) temporary recommendation until IDEQ establishes its SR-HC phosphorus TMDL.

Table 6. Proposed No Net Increase (NNI) Phosphorous Load

Tributary Name	Seasonal Average TP Load, lbs/day	Seasonal Total Load, lbs
Indian Creek	**164**	**30,219**

(IDEQ, 1998)

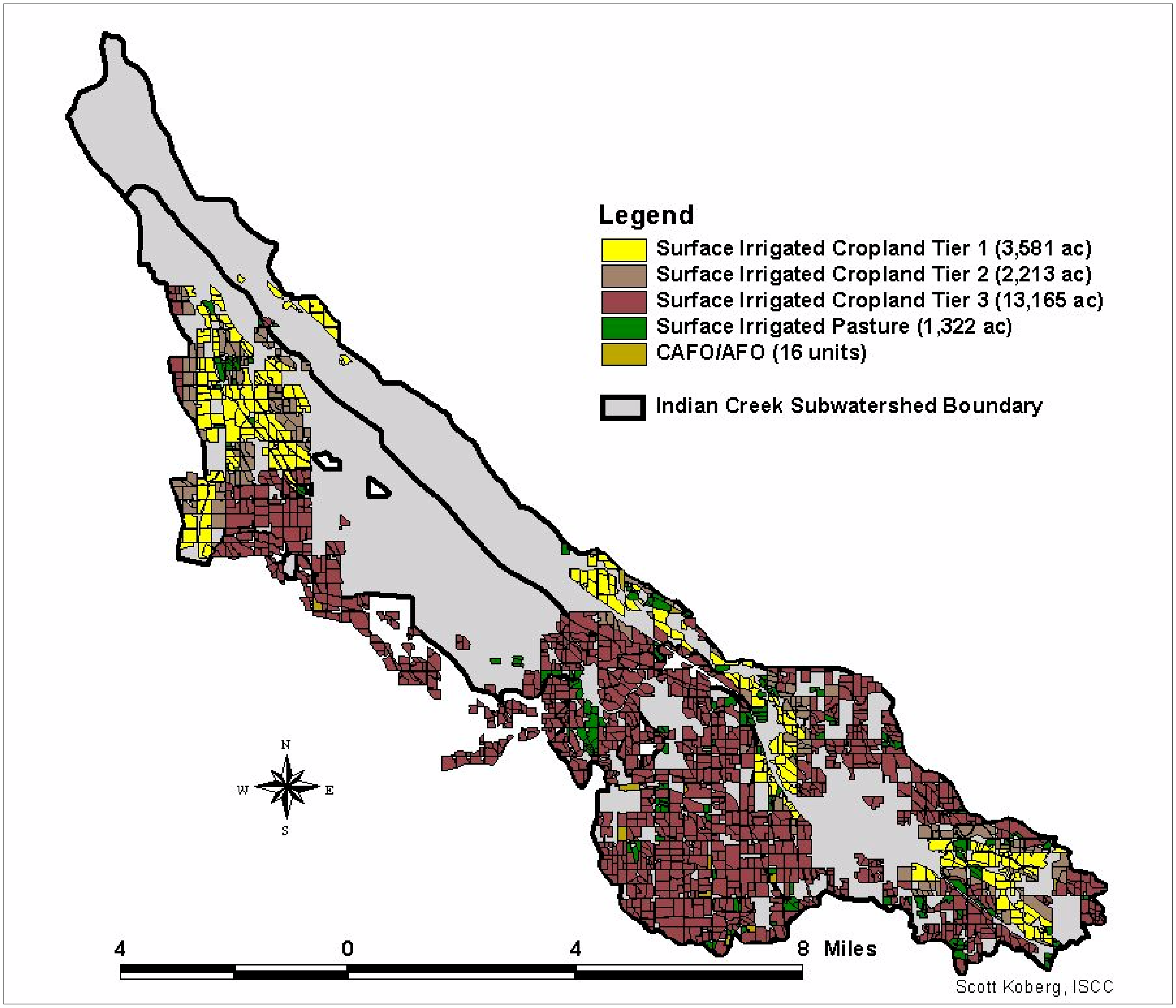
6.0 Identification of Critical Acres

An initial watershed inventory was completed to determine the land areas that affect Indian Creek. Aerial photos, topographic maps and field investigations were all utilized to determine the land areas that impact the water quality of Indian Creek, which affects the Lower Boise River.

Drainage ditches, irrigation supply canals, topography transitions, and roads determine the route of the irrigation wastewater and natural drainage. Irrigation wastewater flows can be intercepted by the canals, drains or reused by neighboring farms, then in turn be reused or intercepted by other drains or canals.

Land treatment though BMP installation will be pursued in three tiers. Agricultural land that drains directly into Indian Creek, Wilson Drain, or any of the sub-drains to Wilson and is downstream from the city of Nampa is included in Tier 1 along with any land that drains directly into Indian Creek in the upper portion. Tier 1 lands have the most immediate impact on Lower Boise River water quality due to their proximity to the surface water tributaries. Unlike Tier 1 lands, Tier 2 lands are not directly adjacent to the tributaries of concern, and the wastewater from Tier 2 acreage has the potential to be reused by Tier 1 acreage before entering Indian Creek or Wilson Drain. Tier 3 acreage is located either in the upper portion of the subwatershed (upstream from Nampa), or in the uplands where wastewater has the potential to be used multiple times by Tier 2 and Tier 1 acreage before entering the receiving waterbodies. In terms of BMP implementation Tier 1 is high priority, Tier 2 is medium priority, and Tier 3 is low priority (Figure 9).

Figure 9. Location of Critical Acres



Critical Acres within each Treatment Unit:

Treatment Unit 1	3,581 acres of Tier 1 surface irrigated cropland 2,213 acres of Tier 2 surface irrigated cropland 13,165 acres of Tier 3 surface irrigated cropland
Treatment Unit 2	1,322 acres of surface irrigated pasture
Treatment Unit 3	There are no critical acres within this treatment unit (Sprinkler)
Treatment Unit 4	16 units of CAFO/AFO

7.0 Implementation Plan BMPs

Agricultural conservation and soil erosion practices are typically referred to as Best Management Practices (BMPs). These practices are nationally derived systems to control, reduce, or prevent soil erosion and sedimentation on agricultural landuses (APAP, 1991). BMPs are selected to reduce irrigation-induced and streambank erosion, contain and filter sediment, nutrients, and bacteria from irrigation wastewater, contain and properly dispose of animal wastes, and reduce leaching of nutrients and pesticides. This will improve the quality of surface waters in the project area and reduce pollutant loading to the Lower Boise River. The status of the beneficial uses for these waters will be maintained or improved with the implementation of this alternative.

BMPs include, but are not limited, to the following:

Table 7. Treatment Unit 1: Surface Irrigated Cropland

Agro-Tillage	Conservation Cropping Sequence
Conservation Tillage	Cover and Green Manure Crop
Filter Strips	Grassed Waterway
Surge Irrigation System	Sprinkler Irrigation System
Tailwater Recovery System	Irrigation Water Management Systems
Straw Mulching	Nutrient Management
Pest Management	Sediment Basin
Underground Outlet	Chiseling and Subsoiling
Waste Utilization	Channel Vegetation
Drip Irrigation System	PAM
Irrigation Water Conveyance	

Table 8. Treatment Unit 2: Surface Irrigated Pasture

Fencing	Stream channel stabilization
Heavy use area protection	Offsite watering
Filter strips	Waste Utilization
Spring water development	Waste Storage System
Irrigation systems	Nutrient Management
Pasture and Hayland Planting	Planned Grazing System
Livestock Watering Facility	Pasture and Hayland Management

Table 9. Treatment Unit 4: CAFO/AFO

Waste Management System	Heavy use area protection
Filter strips	Livestock Watering Facility
Nutrient Management	Fencing

7.1 Example Description of Alternatives for Surface Irrigated Cropland

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

SITE SPECIFIC BMP Alternative #1 ($800/ acre)
Irrigation Water Mgt. Sprinkler Irrigation System Nutrient Mgt. Conservation Crop Rotation

SITE SPECIFIC BMP Alternative #2 ($500/ acre)
Irrigation Water Mgt. Land Leveling Surface Irrigation System Gated Pipe Tail Water Recovery System Nutrient Mgt. Conservation Crop Rotation Conservation Tillage

SITE SPECIFIC BMP Alternative #3 ($250/ acre)
Irrigation Water Mgt. Concrete Ditch Filter Strip PAM Sediment Basin Nutrient Mgt. Conservation Crop Rotation Conservation Tillage

7.2 Example Description of Alternatives for Surface Irrigated Pasture

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

SITE SPECIFIC BMP Alternative #1 ($450/ acre)
Fencing Planned Grazing System Pasture & Hayland Mgt. Nutrient Mgt. Heavy Use Area Protection Livestock Watering Facility Irrigation Water Mgt. Field Border Irrigation System Gated Pipe

SITE SPECIFIC BMP Alternative #2 ($350/ acre)
Fencing Planned Grazing System Pasture & Hayland Mgt. Nutrient Mgt. Livestock Watering Facility Irrigation Water Mgt. Field Border Irrigation System

SITE SPECIFIC BMP Alternative #3 ($250/ acre)
Fencing Pasture & Hayland Mgt. Nutrient Mgt. Livestock Watering Facility Irrigation Water Mgt. Field Border Irrigation System

7.3 Example Description of Alternatives for CAFO/AFO

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

SITE SPECIFIC BMP Alternative #1 ($50,000/ each)
Nutrient Mgt. Heavy Use Area Protection Livestock Watering Facility Filter strips Waste Mgt. System Dike

SITE SPECIFIC BMP Alternative #2 ($35,000/ each)
Waste Mgt. System Nutrient Mgt. Livestock Watering Facility Filter strips Heavy Use Area Protection

SITE SPECIFIC BMP Alternative #3 ($25,000/ each)
Waste Mgt. System Nutrient Mgt. Filter strip Heavy Use Area Protection

7.4 Graphic Comparison of BMP Selection and Implementation Process

The site specific BMP Alternative is chosen based on a variety of factors, but typically reflect the landowner's objectives in conjunction with the resource concerns identified by the assisting agency. The following flow chart provides a graphic representation of selection process and some comparisons between Alternative #1(high cost), Alternative #2 (moderate cost), and Alternative #3 (low cost) for the various treatment units. The chart applies to each of the three treatment units identified in sections 7.1 through 7.3.

ALTERNATIVE #1 ⟷ ALTERNATIVE #3

EVEN ← MAINTENANCE → EVEN
HIGH ← RELATIVE COST → LOW
IMMEDIATE ← TIME TO MEET WATER QUALITY GOALS → EXTENDED
LOWER LABOR ← ASSOCIATED BENEFITS → HIGHER LABOR

ALTERNATIVE SELECTED BY <u>LANDOWNER</u> BASED ON OBJECTIVES AND CAPABILITIES

↓

FINAL DESIGN OF BMP

↓

BMP INSTALLED

↓

FEEDBACK LOOP – IMPLEMENTATION AND EVALUATION MONITORING

↓

IF WATER QUALITY GOALS NOT MET – ADJUST BMP TO MEET WATER QUALITY GOALS

(APAP, 1991)

7.5 BMP Costs

Due to the variability in agriculture, these prices per acre are best professional judgement. With changes in technology, land ownership, crops, agricultural commodities, landuse, and public perception, these costs and acres will change.

Lower cost BMPs are usually temporary in nature and do not address underlying issues relating to irrigation systems and irrigation water management. The yearly maintenance and labor cost of Alternative 3 BMPs are higher than those for Alternative 1 BMPs.

7.6 Feedback Loop

The feedback loop is a process used to evaluate and refine installed BMPs. Implementing the feedback loop to modify BMPs until water quality standards are met results in full voluntary compliance with the standards (APAP, 1991). The feedback loop occurs in four steps:

1. The process begins by developing water quality criteria to protect the identified beneficial uses of the water resource.
2. The existing water quality as compared to the water quality criteria established in Step 1, is the basis for developing or modifying BMPs.
3. The BMP is implemented on-site and evaluated for technical adequacy of design and installation.
4. The effectiveness of the BMP in achieving the criteria established in Step 1 is evaluated by comparison to water quality monitoring data. If the established criteria are achieved the BMP is adequate as designed, installed and maintained. If not, the BMP is modified and the process of the feedback loop continues.

8.0 Program of Implementation

The Canyon Soil Conservation District along with the Ada Soil & Water Conservation District has selected land treatment through application of a combination of BMPs including improved irrigation systems, nutrient and sediment control systems, and management practices. There are currently no sources of funding available for cost-share assistance specifically within the Indian Creek subwatershed priority area. While there are a handful of federal and state site-specific programs available to interested participants on a farm by farm basis, Indian Creek has yet to be selected as a priority area with its own specific project area. Should funding become available for use specifically in the Indian Creek Subwatershed, the implementation of BMPs and distribution of incentive payments will likely be focused within the subwatershed boundary downstream from Nampa and in the Wilson Drain area where the majority of Tier 1 acreage is located. Idaho State Department of Agriculture data collected over a two year period at upstream sites in the subwatershed indicate that the majority of pollutant loading to the Indian Creek system originates from this area.

8.1 Installation and Financing

The USDA Natural Resources Conservation Service (NRCS) is the technical agency that will assist the Idaho Soil Conservation Commission (ISCC), Ada SWCD, and Canyon SCD in developing water quality plans and designs. BMPs will be installed according to standards and specifications contained in the NRCS Field Office Technical Guide. Where cost-share incentives are contracted through a state or federal program, NRCS and ISCC will assist Ada and Canyon Conservation Districts with certification of installed BMPs, filing payment applications, completing annual status reviews on contracts, annual development of an average cost list, and will provide any needed follow-up assistance such as that required for contract modification.

Each participant will be responsible for installing the BMPs scheduled within their contract as planned in the Conservation Plan. Any needed land rights, easements or permits necessary for construction and inspection will be the sole responsibility of the participant. Each participant will also be required to make their own arrangements for financing their share of installation costs.

Table 10. Estimated BMP Cost Summary for Treatment Unit 1, Tier 1 (Surface Irrigated Cropland: 3,581 acres)

ALTERNATIVE		ACRES	TOTAL COSTS
Alternative 1	$800/AC	3581	$ 2,864,800
Alternative 2	$500/AC	3581	$ 1,790,500
Alternative 3	$250/AC	3581	$ 895,250

Table 11. Estimated BMP Cost Summary for Treatment Unit 1, Tier 2 (Surface Irrigated Cropland: 2,213 acres)

ALTERNATIVE		ACRES	TOTAL COSTS
Alternative 1	$800/AC	2213	$ 1,770,400
Alternative 2	$500/AC	2213	$ 1,106,500
Alternative 3	$250/AC	2213	$ 553,250

Table 12. Estimated BMP Cost Summary for Treatment Unit 1, Tier 3 (Surface Irrigated Cropland: 13,165 acres)

ALTERNATIVE		ACRES	TOTAL COSTS
Alternative 1	$800/AC	13,165	$ 10,532,000
Alternative 2	$500/AC	13,165	$ 6,582,500
Alternative 3	$250/AC	13,165	$ 3,291,250

Table 13. Estimated BMP Cost Summary for Treatment Unit 2 (Surface Irrigated Pasture: 1,322 acres)

ALTERNATIVE		ACRES	TOTAL COSTS
Alternative 1	$450/AC	1322	$ 594,900
Alternative 2	$350/AC	1322	$ 462,700
Alternative 3	$250/AC	1322	$ 330,500

Table 14. Estimated BMP Cost Summary for Treatment Unit 4 (CAFO/AFO 16 Units)

ALTERNATIVE		UNITS	TOTAL COSTS
Alternative 1	$50,000/each	16	$ 800,000
Alternative 2	$35,000/each	16	$ 560,000
Alternative 3	$25,000/each	16	$ 400,000

8.2 Operation, Maintenance, and Replacement

Participants who install BMPs in conjunction with a state or federal cost-share incentive program will be responsible for maintaining the installed BMPs for the life of their contract. The contract will outline the responsibility of the participant regarding operation and Maintenance (O&M) for each BMP. Landowners are encouraged to maintain installed BMPs after the contract expires. Participants who install BMPs on their own or without the benefit of a cost-share incentive program are not under contract to maintain the BMPs. If the BMPs are installed in response to a conservation plan completed with them by the assisting agencies, landowners are encouraged to maintain the BMPs and incorporate them into their annual operations. It is not required, however, unless they are under contract.

Inspections of BMPs installed in conjunction with a cost-share incentive program will be made on an annual basis by Ada SWCD and Canyon SCD, NRCS, ISCC, and the participant. The intent is to develop a system of BMPs that will protect water quality and is socially and economically feasible to the participant.

8.3 Water Quality Monitoring

The Idaho State Department of Agriculture (ISDA) collected water quality samples in the Indian Creek Subwatershed, including at the mouth of Wilson Drain, during the 1998 and 1999 irrigation seasons. IDEQ has done extensive monitoring and conducted BURP evaluations on Indian Creek in order to develop the 2001 Indian Creek Subbasin Assessment. Monitoring at the mouth of Indian Creek has been conducted by U.S. Geological Survey (USGS) since well before the TMDL was established (1994), and during the past 2 years USGS has continued to conduct a monitoring program at the mouth. Most samples collected by the various agencies occur on a bimonthly basis throughout the irrigation season (April - October) and on a monthly basis throughout the rest of the year (winter). Data parameters measured thus far have included DO (dissolved oxygen), temperature, % saturation, conductivity, TDS (total dissolved solids) pH, discharge (cfs), TSS (total suspended solids), TVS (total volatile solids), nitrate/nitrite, TP (total phosphorus), OP (dissolved ortho-phosphorus), fecal coliform, and E-coli.

ISDA along with the ISCC and the Idaho Association of Soil Conservation Districts (ISACD) will develop a water quality monitoring plan that will allow trend analysis of water quality and gauge progress toward meeting the TMDL load reductions. The proper time to revisit the subwatershed for evaluation of water quality improvements will be decided through joint agency cooperation, data review, and BMP implementation evaluation. This could be based on a number of factors including percent of critical acres treated, number of major contributors treated, or a specific time interval.

9.0 References

U. S. Department of the Agriculture, Soil Conservation Service (Natural Resource Conservation Service). 1972. *Soil Survey of Canyon County, Idaho*

David F. Ferguson, Idaho Soil Conservation Commission, 1999. *Lower Boise River Drainage Delineation, Technical Report*

Bureau of Reclamation, 1996. *A Description of Bureau of Reclamation System Operation of the Boise and Payette Rivers*

Lower Boise River TMDL, 1998. *Subbasin Assessment, Total Maximum Daily Loads*

Idaho Department of Health & Welfare Division of Environmental Quality and Idaho Department of Lands Soil Conservation Commission 1991. *Idaho Agricultural Pollution Abatement Plan (APAP).*

Scott Koberg, Idaho Soil Conservation Commission, 2001. *Farm Services Agency Data*